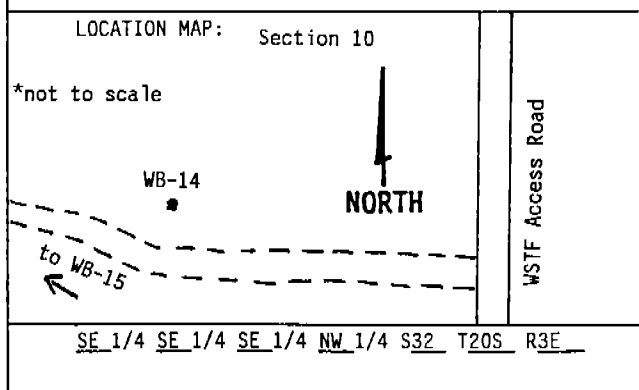


LITHOLOGIC LOG

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SITE ID: NASA-WSTF LOCATION ID: WB-14

SITE COORDINATES (ft.):
N 217704.21 E 410835.15

GROUND ELEVATION (ft. MSL): 4731.68'

STATE: NEW MEXICO COUNTY: DOÑA ANA

DRILLING METHOD: Mud Rotary; Air Foam Rotary

DRILLING CONTR.: Larjon Drilling Co.

DATE STARTED: 02/28/92 DATE COMPLETED: 03/23/92

FIELD REP.: M. Canavan, D. Menzie, P. Egan

COMMENTS: Drilled mud rotary (7 7/8" tricone button/milltooth bits) 0-490'. Set 490' of 5" surface casing. Drilled air/foam rotary (4" air hammer) 490'-550' (TD). Altered tuff bedrock 280'-483'. Tuff bedrock 483'-550'.

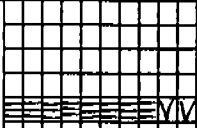


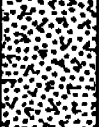
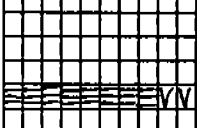

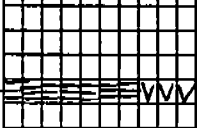
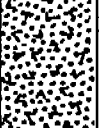

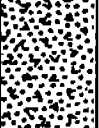
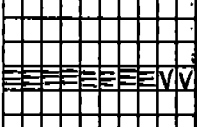
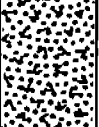
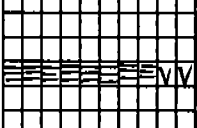
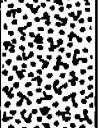
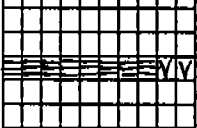

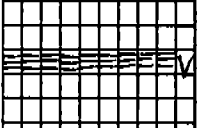


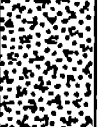
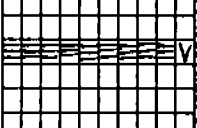

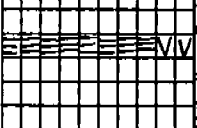
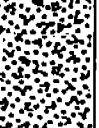
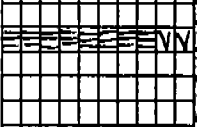
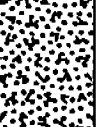
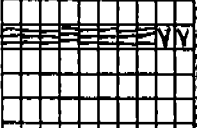

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
0			Timed by driller 0'-550'	Cuttings grab sample 0'-550'	0'-280' Alluvium (Santa Fe Group): Unwashed samples are a pale yellowish brown (10 YR 6/2) to brownish gray (5 YR 4/1) color which is imparted by the presence of limestone as the dominant rock type and varying percentages of clay. formation clasts and cuttings range in size from 0.05" to 1.5" in diameter and are rounded to angular in shape. The alluvium is a poorly sorted, unconsolidated to semi-consolidated pebble to boulder polygenetic conglomerate. Clay content ranges from < 5% to > 90%. Caliche clasts and coatings are prevalent in the uppermost 35' of the alluvium. Sedimentary rock types present include medium gray (N5) to dark gray (N3) micritic limestone; greenish gray (5 GY 6/1) to pale red (5 R 6/2) laminated and non-laminated siltstones; gray to black chert and moderately to poorly sorted fine-grained sandstones. As limestone decreases in percent down section, volcanics increase. Volcanic rock types present include a variety of tuffs, rhyolites and andesites. Tuffs and rhyolites range in color from white to brick red and vary widely in texture and mineralogy. Andesites are dusky red (5 R 3/4) to grayish red-purple (5 RP 4/2) or grayish blue green (5 BG 5/2) (where altered). Volcanic minerals, plagioclase and quartz are abundant as individual grains. Granite and quartzite occur in lesser percentages.
5			6		
10			13		
15			22		
20			60		
25			22		
30			25		
35			24		
40			21		
45			33		
50			7		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
50			10	Cuttings (cont'd)	
55			10		
60			18		
65			10		
70			27		
75			20		
80			39		
85			28		
90			21		
95			34		95'-100' 20% clay as clayballs.
100			21		100'-110' Cuttings are uniform in size and shape. Average .2" in diameter and are subangular to subrounded.
105			24		
110			36		110'-115' Cuttings are slightly larger averaging .3".
115			12		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd)	
115			12		115'-120' Cuttings range from < .10" to 1.0" in diameter and are rounded to angular.
120			23		120'-125' Cuttings are fairly uniform in size, averaging .2" and are subrounded to subangular.
125			29		
130			26		
135			12		
140			14		140'-150' Same as 120'-125'. Some caliche present.
145			14		
150			21		
155			17		155'-190' Cuttings range from .1" to .25" (fairly uniform) and are subangular to subrounded.
160			35		
165			16		
170			15		
175			24		
180			23		





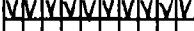

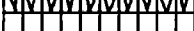



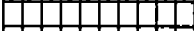







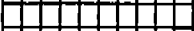




Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
180			23	Cuttings (cont'd)	
185			18		
190			14		190'-230' Cuttings are finer and angular.
195			5		
200			16		
205			23		
210			25		
215			34		
220			22		
225			21		
230			22		230'-235' 30% of cuttings are larger and average .5".
235			15		
240			17		
245			35		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
245			35	Cuttings (cont'd)	245'-270' Cuttings are .1"-.25" and subrounded to angular.
250			16		
255			16		
260			28		
265			22		
270			31		270'-280' Cuttings are finer, averaging .1". Volcanic fraction is notably increasing (predominantly purple and greenish andesites). Cemented alluvium evident in sample and drill times.
275			27		
280			52		280'-290' Clay has a pinkish cast, possible related to expected tuff/rhyolite bedrock. Is <u>very</u> gummy. Whitish and reddish streaks in pale yellowish brown (10 YR 6/2) clay.
285			29		280'-483' <u>Tuff (Highly Altered)</u> : Multicolored silicic-rich vitric crystal tuff. Colors range from white to dark yellowish orange (10 YR 6/6) to moderate reddish brown (10 R 4/6) and very dusky red (10 R 2/2). Minerals present in varying percentages are quartz, various feldspars, biotite and possibly hornblende. Cuttings represent welded tuff vitrophyre and breccia units. Oxidation and partial oxidation of mafic phenocrysts and microlites is partially responsible for the wide range of colors and textures present. 80%-95% of the unit has been altered to a gummy clay which ranges from very pale orange (10 YR 8/2) to pale brown (5 YR 5/2) or pale red (5 R 6/2) in color.
290			15		
295			19		
300			24		
305			23		
310			28		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd)	
310			28		
315			18		
320			21		
325			20		
330			18		
335			18		
340			16		
345			13		
350			18		
355			14		
360			5		
365			15		
370			18		
375			12		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd)	
375			12		
380			12		
385			10		
390			24		
395			39		
400			32		
405			77		
410			46		
415			156 Drill 415'-490' with 7 7/8" milltooth 9		
420					
425			11		425'-430' Clay is a reddish purple color.
430			41		
435			15		
440			14		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
				Cuttings (cont'd)	
440	=====VVV		14		
445	=====VVV		14		445' Clay is very sticky, plastic.
450	=====VV		10		
455	=====V		15		
460	=====VV		13		
465	=====VV		13		
470	=====VV		16		
475	=====VV		9		
480	=====VV		10		
485	VVVVVVVV=====		46		483' Tuff (Cueva?): Pale red (5 R 6/2) to grayish red (5 R 4/2) crystal rich to crystal-vitric tuff. Quartz, plagioclase and K-feldspars each comprise 30-60% of rock. Biotite comprises 10%-20%. A mottled appearance may be due to partial alteration of feldspars to clay, devitrification of glassy groundmass; rapid welding of anhedral mineral constituents or any combination of a above. Cuttings are subangular to rounded and range from .1" to .25" in size.
490	VVVVVVVV=====		70		
495	VVVVVVVVVVVVV		26		
500	VVVVVVVVVVV=====		9		500' Cuttings are uniform \approx .10", rounded and weathered in appearance.
505	VVVVVVVVVVVVV		12		

Depth	Visual %	Lith	Drilling Time Scale: min	Sample Type and Interval	Lithologic Description
505			12	Cuttings (cont'd)	
510			15		
515			13		
520			21		
525			23		
530			23		
535			23		
540			13		
545			21		
550			28		TD = 550'
555					
560					
565					
570	